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Arabidopsis thaliana FAE1 (SEQ ID NO:2)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSKVMD
IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
RKTFAASREE TEKVIIGALE NLFENTKVNP REIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNIKSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
ENITQGIYAG ENRSMMSVNC LFRVGGAAIL LSNKSGDRRR SKYKLVHTR
THTGADDKSF RCVQQEDDES GKIGVCLSKD ITNVAGTTLT KNIATLGPLI
LPLSEKFLFF ATFVAKLLK DKIKHYYPV FKLAVDHFCI HAGGRAVIDE
LEKNLGLSPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKGKNKAW
QIALGSGFKC NSAVWVALRN VKASANSPWQ HCIDRYPVKI DSDLKSKTH
VQNGRS

Brassica napus elongase KCS (SEQ ID NO:4)

MTSINVKLLY HYVITNLFNL CFFPLTAIVA GKAYRLTIDD LHHLYYSYLQ
HNLITIAPLF AFTVFGSVLY IATRPKPVYL VEYSCYLPPT HCRSSISKVM
DIFYQVRKAD PSRNGTCDD SLDLFLRKIQ ERSGLGDETH GPEGLLQVPP
RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
ENITYNIYAG DNRSMMVSNC LFRVGGAAIL LSNKPGDRRR SKYELVHTR
THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
LPLSEKLLFF VTFMGKKLFF DKIKHYYPV FKLAVDHFCI HAGGRAVIDV
LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKGKNKVV
QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
VQNGRS

B. napus elongase KCS (SEQ ID NO:6)

MTSINVKLLY HYVITNLFNL CFFPLTAIVA GKAYLTIDDL HHHLYYSYLQ
NLITIAPLLA FTVFGSVLYI ATRPKPVYLV EYSCYLPPTH CRSSISKVMD
IFFQVRKADP SRNGTCDDSS WLDFLRKIQE RSGLGDETHG PEGLLQVPPR
KTFARAREET EQVIIGALEN LFKNTNVNPK DIGILVVNSS MFNPTPSLSA
MVVNTFKLRS NVRSFNLGGM GCSAGVIAID LAKDLLHVHK NTYALVVSTE
NITYNIYAGD NRSMMVSNC LFRVGGAAIL SNKPRDRRRS KYELVHTRV
HTGADDKSFR CVQQGDDENG QTGVSLSKDI TDVAGRTVKK NIATLGPLIL
PLSEKLLFFV TFMGKKLFFD EIKHYYPVDF KLAVDHFCIH AGGKAVIDVL
EKNLGLAPID VEASRSTLHR FGNTSSSSIW YELAYIEPKG RMKGKNKVWQ
IALGSGFKCN SAVWVALNNV KASTNSPWEH CIDRYPVKID SDSGKSETRV
PNGRS

FIGURE 1-1

At114 (SEQ ID NO:8)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLOH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSKVMD
 IFYQIRKADT SSRNGTCDD S WLDFLRKIQ ERSGLGDETH GPEGLLQVPP
 RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMMVSNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
 THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
 LPLSEKLLFF VTFMGKKLFF DKIKHYYPV FKLAIHDFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKGKGNKVW
 QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
 VPNGRS

At74 (SEQ ID NO:10)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLOH
 NLITVTLLFA FTVFGLVLYI VTRPKPVYLV EYSCYLPPH CRSSISKVMD
 IFYQVRKADP SRNGTCDDSS WLDFLRKIQE RSGLGDETHG PEGLLQVPPR
 KTFAAAREET EQVIIGALEN LFKNTNVNPK DIGILVVNSS MFNPTPSLSA
 MVVNTFKLRS NVRSFNLGGM GCSAGVIAID LAKDLLHVHK NTYALVSTE
 NITYNIYAGD NRSMMVSNC LFRVGGAAIL SNKPGDRRRS KYELVHTVRT
 HTGADGKSFR CVQQGDDENG KIGVSLSKDI TDVAGRTVKK NIATLGPLIL
 PLSEKLLFFV TFMGKKLFD KIKHYYPDF KLAIHDFCIH AGGRAVIDVL
 EKNLALAPID VEASRSTLHR FGNTSSSSIW YELAYIEAKG RMKGKGNKVWQ
 IALGSGFKCN SAVWVALNNV KASTNSPWEH CIDRYPVKID SDSGKSETRV
 QNGRS

At114 L91C K92R (SEQ ID NO:12)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLOH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH **CRVSVSKVMD**
 IFYQIRKADT SSRNGTCDNS WLDFLRKIQ ERSGLGDETH GPEGLLQVPP
 RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMMVSNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
 THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
 LPLSEKLLFF VTFMGKKLFF DKIKHYYPV FKLAIHDFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKGKGNKVW
 QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
 VPNGRS

FIGURE 1-2

At114 K92R (SEQ ID NO:14)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LRVSVSKVMD
IFYQIRKADT SSRNGTCDDS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAkdLLHVH KNTYALVVST
ENITYNIYAG DNRSMMSVNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
LPLSEKLLFF VTFMGKKLFK DKIKHYYPVDF FKLAIHDFCI HAGGRAVIDV
LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKGKGNKVW
QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
VPNGRS

At114 G307D (SEQ ID NO:16)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSKVMD
IFYQIRKADT SSRNGTCDDS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAkdLLHVH KNTYALVVST
ENITYNIYAG DNRSMMSVNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
LPLSEKLLFF VTFMGKKLFK DKIKHYYPVDF FKLAIHDFCI HAGGRAVIDV
LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKGKGNKVW
QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
VQNGRS

At74 G306D (SEQ ID NO:18)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
NLITVTLLFA FTVFGLVLYI VTRPKPVYLV EYSCYLPPTH CRSSISKVMD
IFYQVRKADP SRNGTCDDSS WLDFLRKIQE RSGLGDETHG PEGLLQVPPR
KTFAAAREET EQVIIGALEN LFKNTNVNPK DIGILVVNSS MFNPTPSLSA
MVVNTFKLRS NVRSFNLGGM GCSAGVIAID LAKDLLHVHK NTYALVVSTE
NITYNIYAGD NRSMMVSNC LFRVGGAAIL LSNKPGDRRRS KYELVHTVRT
HTGADGKSF RCVQQGDDENG KIGVSLSKDI TDVAGRTVKK NIATLGPLIL
PLSEKLLFFV TFMGKKLFD KIKHYYPDF KLAIDHFCIH AGGRAVIDVL
EKNLALAPID VEASRSTLHR FGNTSSSSIW YELAYIEAKG RMKGKGNKVWQ
IALGSGFKCN SAVWVALNNV KASTNSPWEH CIDRYPVKID SDSGKSETRV
QNGRS

FIGURE 1-3

At114 L91C K92R G307D (SEQ ID NO:20)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH **CRVSVSKVMD**
 IFYQIRKADT SSRNGTCDNS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
 RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAkdLLHVH KNTYALVVST
 ENITYNIYAG DNRSMMSVNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
 THTGADDKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
 LPLSEKLLFF VTFMGKKLFK DKIKHYYPVDP FKLAIDHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGNKVW
 QIALGSGFKC NSAVWVALNN VKASTNSPWE HCDRYPVKI DSDSGKSETR
 VQNGRS

At114 K92R G307D (SEQ ID NO:22)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH **LRVSVSKVMD**
 IFYQIRKADT SSRNGTCDDS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
 RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAkdLLHVH KNTYALVVST
 ENITYNIYAG DNRSMMSVNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
 THTGADDKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
 LPLSEKLLFF VTFMGKKLFK DKIKHYYPVDP FKLAIDHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGNKVW
 QIALGSGFKC NSAVWVALNN VKASTNSPWE HCDRYPVKI DSDSGKSETR
 VQNGRS

At254 (SEQ ID NO:24)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNLLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH **LKVSVSKVMD**
 IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
 RKTFAASREE TEKVIIGALE NLFENTKVNP REIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNIKSFNLGG MGCSAGVIAI DLAkdLLHVH KNTYALVVST
 ENITYNIYAG DNRSMMSVNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
 THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
 LPLSEKLLFF VTFMGKKLFK DKIKHYYPVDP FKLAIDHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGNKVW
 QIALGSGFKC NSAVWVALNN VKASTNSPWE HCDRYPVKI DSDSGKSETR
 VPNGRS

FIGURE 1-4

At173 (SEQ ID NO:26)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSKVMD
IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
RKTFAASREE TEKVIIGALE NLFKNTNVNP KDIGILVNS SMFNPTPSLS
AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAkdLLHVH KNTYALVVST
ENITYNIYAG DNRSMMVSNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
LPLSEKLLFF VTFMGKKLFK DKIKHYYPVDP FKLAI DHFCI HAGGRAVIDV
LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKVKW
QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
VQNGRS

Bn176 (SEQ ID NO:28)

MTSINVKLLY HYVITNLFNL CFFPLTAIVA GKAYRLTIDD LHHLYYSYLQ
HNLITIAPLF AFTVFGSVLY IATRPKPYLV VEYSCYLPPPT HCRSSISKVM
DIFYQVRKAD PSRNGTCDDS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
RKTFAAAREE TEQVIIGALE NLFKNTKVNP REIGILVNS SMFNPTPSLS
AMVVNTFKLR SNIKSFNLGG MGCSAGVIAI DLAkdLLHVH KNTYALVVST
ENITQGIYAG ENRSMMVSNC LFRVGGAAIL LSNKSGDRRR SKYKL VHTVR
THTGADDKSF RCVQQEDDES GKIGVCLSKD ITNVAGTTLT KNIATLGPLI
LPLSEKFLFF ATFVAKKLLK DKIKHYYPVDP FKLAV DHFCI HAGGRAVIDE
LEKNLGLSPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKNAW
QIALGSGFKC NSAVWVALRN VKASANS PWQ HCIDRYPVKI DSDLSKSKTH
VQNGRS

At399 (SEQ ID NO:30)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSKVMD
IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
RKTFAASREE TEKVIIGALE NLFENTKVNP REIGILVNS SMFNPTPSLS
AMVVNTFKLR SNIKSFNLGG MGCSAGVIAI DLAkdLLHVH KNTYALVVST
ENITQGIYAG ENRSMMVSNC LFRVGGAAIL LSNKSGDRRR SKYKL VHTVR
THTGADDKSF RCVQQEDDES GKIGVCLSKD ITNVAGTTLT KNIATLGPLI
LPLSEKFLFF ATFVAKKLLK DKIKHYYPVDP FKLAV DHFCI HAGGRAVIDV
LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKVKW
QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
VQNGRS

FIGURE 1-5

Bn399 (SEQ ID NO:32)

MTSINVKLLY HYVITNLFNL CFFPLTAIVA GKAYRLTIDD LHHLYYSYLO
HNLITIAPLF AFTVFGSVLY IATRPKPVYL VEYSCYLPPT HCRSSISKVM
DIFYQVRKAD PSRNGTCDDS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
ENITYNIYAG DNRSMMSVNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
LPLSEKLLFF VTFMGKKLFK DKIKHYYVPD FKLAI DHFCI HAGGRAVIDE
LEKNLGLSPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMCKGNKAW
QIALGSGFKC NSAVWVALRN VKASANSPWQ HCDRYPVKI DSDLKSKTH
VQNGRS

Bn G307D (SEQ ID NO:34)

MTSINVKLLY HYVITNLFNL CFFPLTAIVA GKAYRLTIDD LHHLYYSYLO
HNLITIAPLF AFTVFGSVLY IATRPKPVYL VEYSCYLPPT HCRSSISKVM
DIFYQVRKAD PSRNGTCDDS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
ENITYNIYAG DNRSMMSVNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
LPLSEKLLFF VTFMGKKLFK DKIKHYYVPD FKLAI DHFCI HAGGRAVIDV
LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMCKGNKVV
QIALGSGFKC NSAVWVALNN VKASTNSPWE HCDRYPVKI DSDSGKSETR
VQNGRS

At K92R (SEQ ID NO:36)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLOH
NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPTH LRVSVSKVMD
IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
RKTFAASREE TEKVIIGALE NLFENTKVNP REIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNIKSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
ENITQGIYAG ENRSMMSVNC LFRVGGAAIL LSNKSGDRRR SKYKLVHTVR
THTGADGKSF RCVQQEDDES GKIGVCLSKD ITNVAGTTLT KNIATLGPLI
LPLSEKFLFF ATFVAKKLLK DKIKHYYVPD FKLAVDHFCI HAGGRAVIDE
LEKNLGLSPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMCKGNKAW
QIALGSGFKC NSAVWVALRN VKASANSPWQ HCDRYPVKI DSDLKSKTH
VQNGRS

FIGURE 1-6

At254 G307D (SEQ ID NO:38)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSKVMD
IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
RKTFEASREE TEKVIIGALE NLFENTKVNP REIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNIKSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
ENITYNIYAG DNRSMMSVNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
THTGADDKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
LPLSEKLLFF VTFMGKKLFF DKIKHYYPVD FKLAIDHFCI HAGGRAVIDV
LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKQVW
QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
VQNGRS

At173 G307D (SEQ ID NO:40)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSKVMD
IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
RKTFEASREE TEKVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
ENITYNIYAG DNRSMMSVNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
THTGADDKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
LPLSEKLLFF VTFMGKKLFF DKIKHYYPVD FKLAIDHFCI HAGGRAVIDV
LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKQVW
QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
VQNGRS

Bn399 G307D (SEQ ID NO:42)

MTSINVKLLY HYVITNLFNL CFFPLTAIVA GKAYRLTIDD LHHLYYSYLO
HNLITIAPLF AFTVFGSVLY IATRPKPVYL VEYSCYLPPT HCRSSISKVM
DIFYQVRKAD PSRNGTCDDS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
RKTFEAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
ENITYNIYAG DNRSMMSVNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
THTGADDKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
LPLSEKLLFF VTFMGKKLFF DKIKHYYPVD FKLAIDHFCI HAGGRAVIDE
LEKNLGLSPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKQVW
QIALGSGFKC NSAVWVALRN VKASANSWPQ HCIDRYPVKI DSDLSKSKTH
VQNGRS

FIGURE 1-7

Arabidopsis thaliana FAE1 (SEQ. ID NO:1)

atgacgtccg ttaacgttaa gctcctttac cgttacgtct taaccaactt
tttcaacctc tgtttggtcc cgttaacggc gttcctcgcc ggaaaagcct
ctcggcttac cataaacgat ctccacaact tcctttccta tctccaacac
aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
gttaccttcc accaccgcat ctcaaagtta gtgtctctaa agtcatggat
atcttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
tgatgatccg tctcgcctcg atttctgag gaagattcaa gagcgttcag
gtctaggtga tgagacgtac agtctgagg gactcattca cgtaccaccg
cggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
tgcgctcgaa aatctattcg agaacaccaa agttaaccct agagagattg
gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
gctatggtcg ttaatacttt caagctccga agcaacatca aaagctttaa
tctaggagga atgggttgta gtgctggtgt tattgccatt gatttggcta
aagacttggt gcatgttcat aaaaacactt atgctcttgt ggtgagcact
gagaacatca cacaaggcat ttatgctgga gaaaatagat caatgatggt
tagcaattgc ttgtttcgtg ttggtggggc cgcgattttg ctctctaaca
agtcgggaga ccggagacgg tccaagtaca agctagttca cacgggtccga
acgcatactg gagctgatga caagtctttt cgatgtgtgc aacaagaaga
cgatgagagc ggcaaaatcg gagtttgtct gtcaaaggac ataaccaatg
ttgcggggac aacacttacg aaaaatatag caacattggg tccgttgatt
cttcctttta gcgaaaagtt tctttttttc gctaccttcg tcgccaagaa
acttctaaag gataaaatca agcattacta tgttccggat ttcaagcttg
ctgttgacca tttctgtatt catgccggag gcagagccgt gatcgatgag
ctagagaaga acttaggact atcgccgac gatgtggagg catctagatc
aacgttacat agatttggga atacttcac tagctcaatt tggatatgaat
tagcatacat agaggcaaag ggaagaatga agaaagggaa taaagcttgg
cagattgctt taggatcagg gtttaagtgt aatagtgcgg tttgggtggc
tctacgcaat gtcaaggcat cggcaaatag tccttggcaa cattgcatcg
atagatatcc ggttaaaatt gattctgatt tgtcaaagtc aaagactcat
gtccaaaacg gtcggtccta atttgatgta tctgagtgcc aacgtttact
ttgtctttcc tttcttttat tggttatgaa ttagatgttt actaatgttc
ctctcttttt cgttataaat aaagaagttc aattcttcct atagtttcaa
acgcgatttt aagcgtttct atttaggttt acatgaattt cttttacaaa
ccatctttt

FIGURE 2-1

Brassica napus elongase KCS (SEQ ID NO:3)

```

atgacgtcca ttaacgtaaa gtccttttac cattacgtca taaccaacct
tttcaacctt tgcttctttc cgtaaaccgg gatcgtcgcc ggaaaagcct
atcggcttac catagacgat cttcaccact tatactattc ctatctccaa
cacaacctca taaccatcgc tccactcttt gccttcaccg ttttcgggtc
ggttctctac atcgcaaccc ggcccaaacc ggtttacctc gttgagtact
catgctacct tccaccaacg cattgtagat caagtatctc caagggtcatg
gatatctttt atcaagtaag aaaagctgat ccttctcgga acggcacgtg
cgatgactcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
gtctaggcga tgaaactcac gggcccaggg ggctgcttca ggtccctccc
cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
tgcgctagaa aatctattca agaacaccaa cgttaaccct aaagatatag
gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
gcatggtcgc ttaacacttt caagctccga agcaacgtaa gaagctttaa
ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
ttcaaattgc ttggtccgtg ttggtggggc cgctattttg ctctccaaca
agcctggaga tcgtagacgg tccaagtacg agctagttca cacgggtcga
acgcataccg gagctgacgg caagtctttt cgttgcgtgc aacaaggaga
cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
ttgctggtcg aacggttaag aaaaacatag caacgttggg tccggtgatt
cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
aacgttacat agatttggaa acacttcac tagctcaata tgggtatgagt
tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttgg
cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcatcg
acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
gtccaaaacg gtcggtccta ataa

```

FIGURE 2-2

B. napus elongase KCS (SEQ ID NO:5)

```

tagagcgtaa cggaccacaa aagaggatcc atacaaatac atctcatcgc
ttccattact attctccgac acacacactg agcaatgacg tccattaacg
taaagctcct ttaccattac gtcataacca accttttcaa cctttgtttc
tttccattaa cggcgatcgt cgccggaaaa gcctatctta ccatagacga
tcttcaccac ttatactatt cctatctcca acacaacctc ataaccattg
ctccactctt ggccttcacc gttttcgggtt cggttctcta catcgcaacc
cggcccaaac cggtttacct cgtggagtag tcatgctacc ttccaccaac
gcattgtaga tcaagtatct ccaagggtcat ggatatcttt ttccaagtaa
gaaaagctga tccttctcgg aacggcacgt gcgatgactc gtcctggcctt
gacttcttga ggaagattca agaacgttca ggtctaggcg atgaaacca
cgggcccagag gggctgcttc aggtccctcc ccggaagact tttgcgcgcg
cgcgtgaaga gacggagcaa gttatcattg gtgcgctaga aaatctattc
aagaacacca atgttaaccc taaagatata ggtatacttg tggatgaactc
aagcatgttt aatccaactc cttecgctctc cgcgatgggc gttaacactt
tcaagctccg aagcaacgta agaagcttta accttggtgg catgggttgt
agtgccggcg ttatagccat tgatctagca aaggacttgt tgcattgtcca
taaaaatacg tatgctcttg tggtagcac agagaacatc acttataaca
tttacgctgg tgataatagg tccatgatgg tttcaaattg cttgttccgt
gttggtgggg ccgctatttt gctctccaac aagcctagag atcgtagacg
gtccaagtac gagctagttc acacgggttcg aacgcatacc ggagctgacg
acaagtcttt tcgttgcgtg caacaaggag acgatgagaa cggccaaacc
ggagtgaagt tgtccaagga cataaccgat gttgctgggc gaacgggtaa
gaaaaacata gcaacgctgg gtccggtgat tcttccgtta agcgagaaac
ttcttttttt cgttaccttc atgggcaaga aacttttcaa agacgaaatc
aaacattatt acgtcccgga cttcaagctt gctatcgacc atttttgtat
acatgccgga ggcaaagccg tgattgatgt gctagagaag aacctaggcc
tagcaccgat cgatgtagag gcatcaagat caacggtaca tagatttggg
aacacttcat ctagtcaat atggtatgag ttggcataca tagaacccaa
aggaaggatg aagaaaggta ataaagtttg gcagattgct ttagggtcag
gctttaagtg taacagtgca gtttgggtgg ctctaaacaa tgtcaaagct
tcaacaaata gtccttggga acactgcac gacagatacc cgggttaaaat
tgattctgat tcaggtagt cagagactcg tgtcccaaac ggtcggctct
aataaatgat gtttgctctc tttcgtttct ttttattggt tataataatt
tgatggccac gatgtttctc ttgtttgtta tgaataaaga atcccacggt
gttctagtaa aaaaaaaaaa aaaaaaaaaa aaaaaa

```

FIGURE 2-3

At114 (SEQ ID NO:7)

atgacgtccg ttaacgttaa gctcctttac cgttatgtct taaccaactt
tttcaacctc tgtttggtcc cgtaaacggc gttcctcgcc ggaaaagcct
ctcggcttac cataaacgat ctccacaact tcctttccta tctccaacac
aaccttataa cagtaacttt actcctttgct ttcactgttt tcggtttggt
tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
gttaccttcc gccaccgcat ctcaaagtta gtgtctctaa agtcatggat
atcttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
tgatgattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
cggaagactt ttgcggcggc gcgtagaag acggagcaag ttatcattgg
tgcgctagaa aatctattca agaacaccaa cgtaaacctt aaagatatag
gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
gcatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
gagaacatca cttataacat ttacgctggg gataataggt ccatgatggt
ttcaaattgc ttgttcggtg ttggtggggc cgctattttg ctctccaaca
agcctggaga tcgtagacgg tccaagtag agctagttca cacggttcga
acgcataccg gagctgacgg caagtctttt cgttgcgtgc aacaaggaga
cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
ttgctggtcg aacggttaag aaaaacatag caacgttggg tccgttgatt
cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
aacgttacat agatttgga acacttcac tagctcaata tggtagagt
tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttgg
cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcatcg
acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
gtcccaaacg gtcggtccta a

FIGURE 2-4

At74 (SEQ ID NO:9)

```

atgacgtccg ttaacgttaa gtccttttac cgttacgtct taaccaactt
tttcaacctc tgtttggtcc cgttaacggc gttcctcgcc ggaaaagcct
ctcggcttac cataaacgat ctccacaact tcctttccta tctccaacac
aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
tctctacatc gtaaccgcac ccaaaccggt ttacctcggt gagtactcat
gctaccttcc accaacgcat tgtagatcaa gtatctccaa ggtcatggat
atcttttatc aagtaagaaa agctgatcct tctcggaacg gcacgtgcga
tgactcgtcg tggcttgact tcttgaggaa gattcaagaa cggtcaggtc
taggcgatga aactcacggg cccgaggggc tgcttcaggc ccctccccgg
aagacttttg cggcggcgcg tgaagagacg gagcaagtta tcattggtgc
gctagaaaat ctattcaaga acaccaacgt taaccctaaa gatataggta
tacttggtgt gaactcaagc atgtttaatc caactccatc gctctccgcg
atggtcggtt acactttcaa gctccgaagc aacgtaagaa gctttaacct
tggtggcatg ggttgtagtg ccggcggtat agccattgat ctagcaaagg
acttgttgca tgtccataaa aatacgtatg ctcttggtgt gagcacagag
aacatcactt ataacattta cgctggtgat aatagggtcca tgatggttcc
aaattgcttg ttccgtgttg gtggggccgc tattttgctc tccaacaagc
ctggagatcg tagacgggcc aagtacgagc tagttcacac gggtcgaacg
cataccggag ctgacggcaa gtcttttcgt tgcgtgcaac aaggagacga
tgagaacggc aaaatcggag tgagtttgtc caaggacata accgatgttg
ctggtcgaac ggttaagaaa aacatagcaa cgttgggtcc gttgattcct
ccgttaagcg agaaacttct ttttttcggt accttcattg gcaagaaact
tttcaaagat aaaatcaaac attactacgt cccggatttc aaacttgcta
ttgaccattt ttgtatacat gccggaggca gagccgtgat tgatgtgcta
gagaagaacc tagccctagc accgatcgat gtagaggcat caagatcaac
gttacataga tttggaaaca cttcatctag ctcaatatgg tatgagttgg
catacataga agcaaaaagga aggatgaaga aaggtataaa agtttggcag
attgctttag ggtcaggctt taagtgtaac agtgcagttt ggggtggctct
aaacaatgtc aaagcttcga caaatagtcc ttgggaacac tgcacgcaca
gataccgggt caaaattgat tctgattcag gtaagtcaga gactcgtgtc
caaaacggtc ggtcctaa

```

FIGURE 2-5

At114 L91C K92R (SEQ ID NO:11)

atgacgtccg ttaacgttaa gctcctttac cgttatgtct taaccaactt
tttcaacctc tgtttggtcc cgtaacggc gttcctcgcc ggaaaagcct
ctcggcttac cataaacgat ctccacaact tcctttccta tctccaacac
aaccttataa cagtaacttt actctttgct ttcactgttt tcgggttggt
tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
gttaccttcc gccaccgcat **tg**cagagtta gtgtctctaa agtcatggat
atthttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
tgataattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
cggaagactt ttgctggcgc gcgtgaagag acggagcaag ttatcattgg
tgcgctagaa aatctattca agaacaccaa cgtaaacctt aaagatatag
gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
gcatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
ttcaaattgc ttgttcctg ttggtggggc cgctattttg ctctccaaca
agcctggaga tcgtagacgg tccaagtag agctagtcca cacggttcga
acgcataccg gagctgacgg caagtctttt cgttgcgtgc aacaaggaga
cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
ttgctggtcg aacggttaag aaaaacatag caacgttggg tccgttgatt
cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
actttttcaa gataaaatca aacattacta cgtcccggat ttcaaacttg
ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
aacgttacat agatttgga acacttcac tagctcaata tggatgagt
tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttgg
cagattgctt tagggtcagg cttaagtgt aacagtgcag tttgggtggc
tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcacgc
acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
gtcccaaacg gtcggtccta a

FIGURE 2-6

At114 K92R (SEQ ID NO:13)

atgacgtccg ttaacgttaa gtccttttac cgttatgtct taaccaactt
tttcaacctc tgtttggtcc cgttaacggc gttcctcgcc ggaaaagcct
ctcggttac cataaacgat ctccacaact tcctttccta tctccaacac
aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
gttaccttcc gccaccgcat ct**cag**agtta gtgtctctaa agtcatggat
atcttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
tgatgattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
gtctaggcga tgaaactcac gggcccagg ggctgcttca ggtccctccc
cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
tgcgctagaa aatctattca agaacaccaa cgttaaccct aaagatatag
gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
gcatgggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
gagaacatca cttataacat ttacgctggt gataataggt ccatgatggg
ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
agcctggaga tcgtagacgg tccaagtacg agctagttca cacggttcga
acgcataccg gagctgacgg caagtctttt cgttgcgtgc aacaaggaga
cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
ttgctggtcg aacggttaag aaaaacatag caacgttggg tccggttgatt
cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
aacgttacat agatttgga acacttcac tagctcaata tgggtatgagt
tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttgg
cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcatcg
acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
gtcccaaacg gtcggtccta a

FIGURE 2-7

At114 G307D (SEQ ID NO:15)

atgacgtccg ttaacgttaa gtccttttac cgttatgtct taaccaactt
tttcaacctc tgtttggtcc cgttaacggc gttcctcgcc ggaaaagcct
ctcggttac cataaacgat ctccacaact tcctttccta tctccaacac
aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
gttaccttcc gccaccgcat ctcaaagtta gtgtctctaa agtcatggat
atthttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
tgatgattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
tgcgctagaa aatctattca agaacaccaa cgtaaacctt aaagatatag
gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
gcatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
ttcaaattgc ttgttccgtg ttgggtggggc cgctattttg ctctccaaca
agcctggaga tcgtagacgg tccaagtacg agctagttca cacggttcga
acgcataccg gagctgacga caagtctttt cgttgcgtgc aacaaggaga
cgatgagaac ggcaaaatcg gaggtagttt gtccaaggac ataaccgatg
ttgctggtcg aacggttaag aaaaacatag caacgttggg tccgttgatt
cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
aacgttacat agatttgga acacttcac tagctcaata tggatgagt
tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttg
cagattgctt tagggtcagg cttaagtgt aacagtgcag tttgggtggc
tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcatcg
acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
gtccaaaacg gtcggtccta a

FIGURE 2-8

At74 G306D (SEQ ID NO:17)

```

atgacgtccg ttaacgttaa gtccttttac cgttacgtct taaccaactt
tttcaacctc tgtttggtcc cgttaacggc gttcctcgcc ggaaaagcct
ctcggccttac cataaacgat ctccacaact tcctttccta tctccaacac
aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
tctctacatc gtaacccgac ccaaaccggt ttacctcggt gagtactcat
gctaccttcc accaacgcat tgtagatcaa gtatctccaa ggtcatggat
atcttttatac aagtaagaaa agctgacctc tctcggaacg gcacgtgcga
tgactcgtcg tggcttgact tcttgaggaa gattcaagaa cggtcaggtc
taggcgatga aactcacggg cccgaggggc tgcttcagggt cctccccggg
aagacttttg cggcggcgcg tgaagagacg gagcaagtta tcattggtgc
gctagaaaat ctattcaaga acaccaacgt taaccctaaa gatataggta
tacttggtgt gaactcaagc atgtttaatc caactccatc gctctccgcg
atggtcgtta acactttcaa gctccgaagc aacgtaagaa gctttaacct
tggtggcatg ggttgtagtg ccggcggtat agccattgat ctagcaaagg
acttgttgca tgtccataaa aatacgtatg ctcttggtgt gagcacagag
aacatcactt ataacattta cgctgggtgat aatagggtcca tgatggtttc
aaattgcttg ttccgtgttg gtggggcgcg tattttgctc tccaacaagc
ctggagatcg tagacggtcc aagtacgagc tagttcacac ggttcgaacg
cataccggag ctgacgacaa gtcttttcgt tgcgtgcaac aaggagacga
tgagaacggc aaaatcggag tgagtttgct caaggacata accgatgttg
ctggtcgaac ggtaagaaa aacatagcaa cgttgggtcc gttgattcct
ccgttaagcg agaaacttct ttttttcggt accttcattg gcaagaaact
tttcaaagat aaaatcaaac attactacgt cccggatttc aaacttgcta
ttgaccattt ttgtatacat gccggaggca gagccgtgat tgatgtgcta
gagaagaacc tagccctagc accgatcgat gtagaggcat caagatcaac
gttacataga tttggaacaa cttcatctag ctcaatatgg tatgagttgg
catacataga agcaaaagga aggatgaaga aaggtaataa agtttggcag
attgcttttag ggtcaggctt taagtgtaac agtgcagttt ggggtggctct
aaacaatgtc aaagcttcga caaatagtcc ttgggaacac tgcacgcaca
gatacccggt caaaattgat tctgattcag gtaagtcaga gactcgtgtc
caaaacggtc ggtcctaa

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FIGURE 2-9

At114 L91C K92R G307D (SEQ ID NO:19)

atgacgtccg ttaacgttaa gctcctttac cgttatgtct taaccaactt
tttcaacctc tgtttggtcc cgttaacggc gttcctcgcc ggaaaagcct
ctcggcttac cataaacgat ctccacaact tcctttccta tctccaacac
aaccttataa cagtaacttt actctttgct ttcactgttt tcgggttggt
tctctacatc gtaaccogac ccaatccggg ttatctcggt gactactcgt
gttaccttcc gccaccgcat **tg**cagagtta gtgtctctaa agtcatggat
atthttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
tgataattcg tcgtggcctg acttcttgag gaagattcaa gaacgttcag
gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
tgcgctagaa aatctattca agaacaccaa cgtaaccct aaagatatag
gtatacttgt ggtgaactca agcatgttta atccaactcc atcgtctctc
gcgatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
ccttggtggc atggggttga gtgccggcgt tatagccatt gatctagcaa
aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
gagaacatca cttataacat ttacgctggg gataataggc ccatgatggg
ttcaaattgc ttgttccgtg ttggtggggc cgctatthttg ctctccaaca
agcctggaga tcgtagacgg tccaagtacg agctagttca cacgggttca
acgcataccg gagctgacga **ca**agtcctttt cgthtgctgc aacaaggaga
cgatgagaac ggcaaaatcg gaggtagttt gtccaaggac ataaccgatg
ttgctggtcg aacgggttaag aaaaacatag caacgttggg tccgttgatt
cttccgttaa gcgagaaact tctthttttt gttaccttca tgggcaagaa
actthttcaa gataaaatca aacattacta cgtcccggat ttcaaacttg
ctattgacca thtttgata catgccggag gcagagccgt gattgatgtg
ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
aacgttacat agatttgga acacttcac tagctcaata tggatgagt
tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagthttg
cagattgctt tagggtcagg ctthtaagtgt aacagtgcag thttgggtggc
tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcacgc
acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
gtccaaaacg gtcgggtccta a

FIGURE 2-10

At114 K92R G307D (SEQ ID NO:21)

atgacgtccg ttaacgttaa gctcctttac cgttatgtct taaccaactt
tttcaacctc tgtttggtcc cgtaaaccgc gttcctcgcc ggaaaagcct
ctcggttac cataaacgat ctccacaact tcctttccta tctccaacac
aaccttataa cagtaacttt actctttgct ttcactgttt tcgggttggt
tctctacatc gtaaccgcac ccaatccggt ttatctcggt gactactcgt
gttaccttcc gccaccgcat ct**cag**agtta gtgtctctaa agtcatggat
atcttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
tgatgattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
tgcgctagaa aatctattca agaacaccaa cgtaaacctt aaagatatag
gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
gcatggtcgc ttaacacttt caagctccga agcaacgtaa gaagctttaa
ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
gagaacatca cttataacat ttacgctggg gataataggt ccatgatggt
ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
agcctggaga tcgtagacgg tccaagtagc agctagttca cacggttcga
acgcataccg gagctgac**ga** caagtctttt cgttgcgtgc aacaaggaga
cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
ttgctggtcg aacggttaag aaaaacatag caacgttggg tccgttgatt
cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
ctagagaaga acctagccct agcacccgat gatgtagagg catcaagatc
aacgttacat agatttgga acacttcac tagctcaata tggtatgagt
tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttgg
cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcacgc
acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
gtccaaaacg gtcggtccta a

FIGURE 2-11

At254 (SEQ ID NO:23)

atgacgtccg ttaacgttaa gtccttttac cgttacgtct taaccaactt
tttcaacctc tgtttggtcc cgttaacggc gttcctcgcc ggaaaagcct
ctcggttac cataaacgat ctccacaacc tcttttccta tctccaacac
aaccttataa cagtaacttt actctttgct ttactgttt tcggtttggt
tctctacatc gtaaccgcac ccaatccggt ttatctcggt gactactcgt
gttaccttcc accaccgcat ctcaaagtta gtgtctctaa agtcatggat
atthttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
tgatgatccg tctctgctcg atttcttgag gaagattcaa gagcgttcag
gtctaggtga tgagacgtac agtcttgagg gactcattca cgtaccaccg
cggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
tgcgctcgaa aatctattcg agaacaccaa agttaaccct agagagattg
gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
gctatggctg ttaatacttt caagctccga agcaacatca aaagctttaa
tctaggagga atgggttgta gtgctggtgt tattgccatt gatttggcta
aagacttggt gcatgttcat aaaaacactt atgctctcgt ggtgagcaca
gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
ttcaaattgc ttgttccgtg ttggtggggc cgctatthtg ctctccaaca
agcctggaga tcgtagacgg tccaagtacg agctagtcca cacggttcga
acgcataccg gagctgacgg caagtctttt cgttgcgtgc aacaaggaga
cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
ttgctggtcg aacgggttaag aaaaacatag caacggtggg tccgttgatt
cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
aacgttacat agatttgga acacttcac tagctcaata tggatagagt
tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttg
cagattgctt tagggtcagg ctthaagtgt aacagtgcag tttgggtggc
tctaaacaat gtcaaagctt cgacaaatag tcttgggaa cactgcacg
acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
gtcccaaacg gtcggtccta a

FIGURE 2-12

At173 (SEQ ID NO:25)

atgacgtccg ttaacgttaa gctcctttac cgttacgtct taaccaactt
tttcaacctc tgtttggtcc cgtaaacggc gttcctcgcc ggaaaagcct
ctcggcttac cataaacgat ctccacaact tcctttccta tctccaacac
aaccttataa cagtaacttt actccttggt ttactgttt tcggtttggt
tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
gttaccttcc accaccgcat ctcaaagtta gtgtctctaa agtcatggat
atcttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
tgatgatccg tcctcgctcg atttcctgag gaagattcaa gagcgttcag
gtctaggtga tgagacgtac agtcctgagg gactcattca cgtaccaccg
cggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
tgcgctcgaa aatctattca agaacaccaa cgtaaccct aaagatatag
gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
gcatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
aggacttgtt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
agcctggaga tcgtagacgg tccaagtacg agctagtcca cacggttcga
acgcataaccg gagctgacgg caagtctttt cgttgctgct aacaaggaga
cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
ttgctggtcg aacgggtaag aaaaacatag caacggtggg tccgttgatt
cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
aacgttacat agatttgga acacttcac tagctcaata tggatgagt
tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtgttg
cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcatcg
acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
gtccaaaacg gtcggtccta a

FIGURE 2-13

Bn176 (SEQ ID NO:27)

atgacgtcca ttaacgtaaa gtccttttac cattacgtca taaccaacct
tttcaacctt tgcttctttc cggttaacggc gatcgtcgcc ggaaaagcct
atcggcttac catagacgat cttcaccact tatactattc ctatctccaa
cacaacctca taaccatcgc tccactcttt gccttcaccg ttttcggttc
ggttctctac atcgcaaccc ggcccaaacc ggtttacctc gttgagtact
catgctacct tccaccaacg cattgtagat caagtatctc caaggtcatg
gatatacttt atcaagtaag aaaagctgat ctttctcgga acggcacgtg
cgatgactcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
gtctaggcga tgaaactcac gggcccagag ggctgcttca ggtccctccc
cggaaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
tgcgctagaa aatctattca agaacaccaa agttaaccct agagagattg
gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
gctatggctg ttaatacttt caagctccga agcaacatca aaagctttta
tctaggagga atgggttgta gtgctggtgt tattgccatt gatttggcta
aagacttggt gcatgttcat aaaaacactt atgctcttgt ggtgagcact
gagaacatca cacaaggcat ttatgctgga gaaaatagat caatgatggt
tagcaattgc ttgtttcgtg ttggtggggc cgcgattttg ctctctaaca
agtcggggaga ccggagacgg tccaagtaca agctagtcca cacggtccga
acgcatactg gagctgatga caagtctttt cgatgtgtgc aacaagaaga
tgatgagagc ggcaaaatcg gagtttgtct gtcaaaggac ataaccaatg
ttgcggggac aacacttacg aaaaatatag caacattggg tccgttgatt
cttcctttaa gcgaaaagtt tctttttttc gctaccttcg tcgccaagaa
acttctaaag gataaaatca agcattacta tgttccggat ttcaagcttg
ctgttgacca tttctgtatt catgccggag gcagagccgt gatcgatgag
ctagagaaga acttaggact atcgccgac gatgtggagg catctagatc
aacgttacat agatttggga atacttcac tagctcaatt tggatgaat
tagcatacat agaggcaaag ggaagaatga agaaagggaa taaagcttgg
cagattgctt taggatcagg gttaagtgt aatagtgcgg tttgggtggc
tctacgcaat gtcaaggcat cggcaaatag tccttggcaa cattgcatcg
atagatatcc ggttaaaatt gattctgatt tgtcaaagtc aaagactcat
gtccaaaacg gtcggtccta a

FIGURE 2-14

At399 (SEQ ID NO:29).

atgacgtccg ttaacgttaa gctcctttac cgttacgtct taaccaactt
tttcaacctc tgtttggtcc cgttaacggc gttcctcgcc ggaaaagcct
ctcggcttac cataaacgat ctccacaact tcctttccta tctccaacac
aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
gttaccttcc accaccgcat ctcaaagtta gtgtctctaa agtcatggat
atthttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
tgatgatccg tcctcgctcg atttcctgag gaagattcaa gagcgttcag
gtctaggtga tgagacgtac agtcctgagg gactcattca cgtaccaccg
cggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
tgcgctcgaa aatctattcg agaacaccaa agttaaccct agagagattg
gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
gctatggctg ttaatacttt caagctccga agcaacatca aaagctttta
tctaggagga atgggttgta gtgctggtgt tattgccatt gatttggcta
aagacttggt gcatgttcat aaaaacactt atgctcttgt ggtgagcact
gagaacatca cacaaggcat ttatgctgga gaaaatagat caatgatggt
tagcaattgc ttgtttcgtg ttggtggggc cgcgattttg ctctctaaca
agtcggggaga ccggagacgg tccaagtaca agctagtcca cacgggtccga
acgcatactg gagctgatga caagtctttt cgatgtgtgc aacaagaaga
cgatgagagc ggcaaaatcg gagtttgtct gtcaaaggac ataaccaatg
ttgcgggggac aacacttacg aaaaatatag caacattggg tccgttgatt
cttcctttta gcgaaaagtt tctttttttc gctaccttcg tcgccaagaa
acttctaaag gataaaatca agcattacta tggtccggat ttcaagcttg
ctggtgacca tttctgtatt catgccggag gcagagccgt gatcgatgtg
ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
aacgttacat agatttgga acacttcac tagctcaata tggatgagt
tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttgg
cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcacg
acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
gtccaaaacg gtcggtccta a

FIGURE 2-15

Bn399 (SEQ ID NO:31)

```

atgacgtcca ttaacgttaa gctcctttac cattacgtca taaccaacct
tttcaacctt tgcttctttc cgtaaaggc gatcgtcgcc ggaaaagcct
atcggcttac catagacgat cttcaccact tatactattc ctatctccaa
cacaacctca taaccatcgc tccactcttt gccttcacgc ttttcgggtc
ggttctctac atcgcaaccc ggcccaaacc ggtttacctc gttgagtact
catgctacct tccaccaacg cattgtagat caagtatctc caaggtcatg
gatatctttt atcaagtaag aaaagctgat ccttctcgga acggcacgtg
cgatgactcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
tgcgctagaa aatctattca agaacaccaa cgtaaaccct aaagatatag
gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
gcgatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
gagaacatca cttataacat ttacgtggtt gataataggt ccatgatggt
ttcaaattgc ttgttcggtg ttggtggggc cgctattttg ctctccaaca
agcctggaga tcgtagacgg tccaagtacg agctagtcca cacggttcga
acgcataccg gagctgacgg caagtctttt cgttgcgtgc aacaaggaga
cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
ttgctggtcg aacggttaag aaaaacatag caacggtggg tccggttgatt
cttcggttaa gcgagaaaact tctttttttc gttaccttca tgggcaagaa
acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
ctattgacca tttttgtata catgccggag gcagagccgt gatcgatgag
ctagagaaga acttaggact atcgccgacg gatgtggagg catctagatc
aacgttacat agatttggga atacttcacg tagctcaatt tgggtatgaat
tagcatacat agaggcaaag ggaagaatga agaaaggga taaagcttgg
cagattgctt taggatcagg gtttaagtgt aatagtgcgg tttgggtggc
tctacgcaat gtcaaggcat cggcaaatag tccttggtcaa cattgcatcg
atagatatcc ggttaaaatt gattctgatt tgtcaaagtc aaagactcat
gtccaaaacg gtcggtccta a

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FIGURE 2-16

Bn G307D (SEQ ID NO:33)

```

atgacgtcca ttaacgtaaa gtccttttac cattacgtca taaccaacct
tttcaacctt tgcttctttc cgttaacggc gatcgtcgcc ggaaaagcct
atcggcttac catagacgat cttcaccact tatactattc ctatctccaa
cacaacctca taaccatcgc tccactcttt gccttcaccg ttttcggttc
ggttctctac atcgcaaccc ggcccaaacc ggtttacctc gttgagtact
catgctacct tccaccaacg cattgtagat caagtatctc caaggtcatg
gatatctttt atcaagtaag aaaagctgat ctttctcgga acggcacgtg
cgatgactcg tcgtggcctt acttcttgag gaagattcaa gaacgttcag
gtctaggcga tgaaactcac gggcccagagg ggctgcttca ggtccctccc
cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
tgcgctagaa aatctattca agaacaccaa cgttaaccct aaagatatag
gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
gcatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
ccttggtggc atgggttgta gtgcggcgt tatagccatt gatctagcaa
aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
agcctggaga tcgtagacgg tccaagtacg agctagttca cacggttcga
acgcataaccg gagctgacga caagtctttt cgttgcgtgc aacaaggaga
cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
ttgctggtcg aacggttaag aaaaacatag caacgttggg tccggttgatt
cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
aacgttacat agatttgga acacttcac tagctcaata tggtagagt
tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttg
cagattgctt tagggtcagg cttaagtgt aacagtgcag tttgggtggc
tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcatcg
acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
gtccaaaacg gtcggtccta ataa

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FIGURE 2-17

At K92R (SEQ ID NO:35)

atgacgtccg ttaacgttaa gtccttttac cgttacgtct taaccaactt
tttcaacctc tgtttggtcc cgttaacggc gttcctcgcc ggaaaagcct
ctcggcttac cataaacgat ctccacaact tcctttccta tctccaacac
aacettataa cagtaacttt actctttgct ttactgttt tcggtttggt
tctctacatc gtaaccgcac ccaatccggt ttatctcggt gactactcgt
gttaccttcc accaccgat ctacagagta gtgtctctaa agtcatggat
atcttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
tgatgatccg tcctcgctcg atttcctgag gaagattcaa gagcgttcag
gtctaggtga tgagacgtac agtcttgagg gactcattca cgtaccaccg
cgaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
tgcgctcgaa aatctattcg agaacaccaa agttaaccct agagagattg
gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
gctatggtcg ttaatacttt caagctccga agcaacatca aaagctttaa
tctaggagga atgggttgta gtgctggtgt tattgccatt gatttggtta
aagacttggt gcatgttcat aaaaacactt atgctcttgt ggtgagcact
gagaacatca cacaaggcat ttatgctgga gaaaatagat caatgatggt
tagcaattgc ttgtttcgtg ttggtggggc cgcgattttg ctctctaaca
agtcgggaga cgggagacgg tccaagtaca agctagtcca cacgggtccga
acgcatactg gagctgatga caagtctttt cgatgtgtgc aacaagaaga
cgatgagagc ggcaaaatcg gagtttgtct gtcaaaggac ataaccaatg
ttgcggggac aacacttacg aaaaatatag caacattggg tccgttgatt
cttcctttta gcgaaaagtt tctttttttc gctaccttcg tcgccaagaa
acttctaag gataaaatca agcattacta tgttccggat ttcaagcttg
ctgttgacca tttctgtatt catgccggag gcagagccgt gatcgatgag
ctagagaaga acttaggact atcgccgac gatgtggagg catctagatc
aacgttacat agatttggga atacttcac tagctcaatt tggatatgaat
tagcatacat agaggcaaag ggaagaatga agaaagggaa taaagcttgg
cagattgctt taggatcagg gtttaagtgt aatagtgcgg tttgggtggc
tctacgcaat gtcaaggcat cggcaaatag tccttggtcaa cattgcatcg
atagatatcc ggttaaaatt gattctgatt tgtcaaagtc aaagactcat
gtccaaaacg gtcggctcta atttgatgta tctgagtgcc aacgtttact
ttgtctttcc tttcttttat tggttatgaa ttagatgttt actaatgttc
ctctcttttt cgttataaat aaagaagttc aattcttcct atagtttcaa
acgcgatttt aagcgtttct atttaggttt acatgaattt cttttacaaa
ccatctttt

FIGURE 2-18

At254 G307D (SEQ ID NO:37)

atgacgtccg ttaacgttaa gctcctttac cgttacgtct taaccaactt
tttcaacctc tgtttggtcc cgttaacggc gttcctcgcc ggaaaagcct
ctcggcttac cataaacgat ctccacaact tcctttccta tctccaacac
aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
gttaccttcc accaccgcat ctcaaagtta gtgtctctaa agtcatggat
atthttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
tgatgatccg tcctcgctcg atttcctgag gaagattcaa gagcgttcag
gtctagggtga tgagacgtac agtcctgagg gactcattca cgtaccaccg
cggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
tgcgctcgaa aatctattcg agaacaccaa agttaaccct agagagattg
gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
gctatggctg ttaatacttt caagctccga agcaacatca aaagctttta
tctaggagga atgggttgta gtgctggtgt tattgccatt gatttggtta
aagacttggt gcatgttcat aaaaacactt atgctctcgt ggtgagcaca
gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
ttcaaattgc ttgttccgtg ttggtggggc cgctatthttg ctctccaaca
agcctggaga tcgtagacgg tccaagtacg agctagttca cacggttcga
acgcataaccg gagctgacga caagtcttht cgthtgcgtg aacaaggaga
cgatgagaac ggcaaaatcg gagtgagtht gtccaaggac ataaccgatg
ttgctggctg aacgggttaag aaaaacatag caacgthtgg tccgthtgatt
cttccgttaa gcgagaaact tctthtttht gttaccttca tgggcaagaa
actthttcaa gataaaatca aacattacta cgtcccggat ttcaaacttg
ctattgacca thtttggtata catgccggag gcagagccgt gattgatgtg
ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
aacgttacat agatttgga acacttcac tagctcaata tggatagagt
tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagthtgg
cagattgctt tagggtcagg ctthtaagtgt aacagtgcag thtgggtggc
tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcacg
acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
gtccaaaacg gtcggtccta a

FIGURE 2-19

At173 G307D (SEQ ID NO:39)

atgacgtccg ttaacgttaa gctcctttac cgttacgtct taaccaactt
tttcaacctc tgtttggtcc cgttaacggc gttcctcgcc ggaaaagcct
ctcggttac cataaacgat ctccacaact tcctttccta tctccaacac
aaccttataa cagtaacttt actccttgct ttcactgttt tcggtttggt
tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
gttaccttcc accaccgcat ctcaaagtta gtgtctctaa agtcatggat
atthttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
tgatgatccg tcctcgctcg atttcctgag gaagattcaa gagcgttcag
gtctaggtga tgagacgtac agtcctgagg gactcattca cgtaccaccg
cggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
tgcgctcgaa aatctattca agaacaccaa cgttaaccct aaagatatag
gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
gcatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttta
ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
aggacttgtt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
gagaacatca cttataacat ttacgctggt gataataggc ccatgatggt
ttcaaattgc ttgttccgtg ttggtggggc cgctatthttg ctctccaaca
agcctggaga tcgtagacgg tccaagtacg agctagttca cacggttcga
acgcataccg gagctgacga caagtcctttt cgttgcgtgc aacaaggaga
cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
ttgctggtcg aacggttaag aaaaacatag caacgttggg tccgthgatt
cttccgttaa gcgagaaact tctthtttttc gttaccttca tgggcaagaa
actthttcaa gataaaatca aacattacta cgtcccggat ttcaaacttg
ctattgacca thtttgata catgccggag gcagagccgt gattgatgtg
ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
aacgttacat agatttgga acacttcac tagctcaata tggatagagt
tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagthtg
cagattgctt tagggtcagg ctthaagtgt aacagtgcag thtgggtggc
tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcacg
acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
gtccaaaacg gtcggtccta a

FIGURE 2-20

Bn399 G307D (SEQ ID NO:41)

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atgacgtcca ttaacgttaa gtccttttac cattacgtca taaccaacct
tttcaacctt tgcttctttc cgtaaacggc gatcgtcgcc ggaaaagcct
atcggcttac catagacgat cttcaccact tatactattc ctatctccaa
cacaacctca taaccatcgc tccactcttt gccttcaccg ttttcgggtc
ggttctctac atcgcaaccc ggcccaaacc ggtttacctc gttgagtact
catgctacct tccaccaacg cattgtagat caagtatctc caaggctcatg
gatatctttt atcaagtaag aaaagctgat ctttctcgga acggcacgtg
cgatgactcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
tgcgctagaa aatctattca agaacaccaa cgtaaacct aaagatatag
gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
gcgatggctg ttaacacttt caagctccga agcaacgtaa gaagctttta
ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
gagaacatca cttataacat ttacgtgtgt gataataggc ccatgatggt
ttcaaattgc ttgttcctg ttggtggggc cgctattttg ctctccaaca
agcctggaga tcgtagacgg tccaagtacg agctagtcca cacggttcga
acgcataccg gagctgacga caagtctttt cgttgcgtgc aacaaggaga
cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
ttgctggtcg aacgggttaag aaaaacatag caacggtggg tccggttgatt
cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
ctattgacca tttttgtata catgccggag gcagagccgt gatcgatgag
ctagagaaga acttaggact atcgccgac gatgtggagg catctagatc
aacgttacat agatttggga atacttcac tagctcaatt tgggtatgaat
tagcatacat agaggcaaag ggaagaatga agaaaggga taaagcttgg
cagattgctt taggatcagg gtttaagtgt aatagtgcgg tttgggtggc
tctacgcaat gtcaaggcat cggcaaatag tccttggcaa cattgcatcg
atagatatcc ggttaaaatt gattctgatt tgtcaaagtc aaagactcat
gtccaaaacg gtcggtccta a

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FIGURE 2-21